The intra-annual variability of the MLT near the equator is dominated by a strong semiannual oscillation (SSAO), plausibly originated by a differential filtering of the vertically propagating GWs by the stratospheric semi-annually oscillating wind. The MSAO effects are printed on \( T_z \) and abundances, accompanying the mean flow changes. We derive \( T_z \) and \( H_2O \) time series from the stratosphere to the upper mesosphere at low latitudes (see below examples for S/S) and derive seasonal oscillations to study their morphology and their inter-annual variability.

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<td>We use temperature (( v=521 )), water vapor (( v=522 )) and carbon monoxide (( v=520 )) retrieved from MIPAS MA measurements from 2007 to 2012, all derived considering non-LTE effects. We constructed zonal mean time series (averages over 10° latitude boxes) for which we performed a harmonic analysis (decomposition for periods of 365, 182.5, 122, 91, 73 and 61 days) for each year in order to detect inter-annual variations. Below are the time series of zonal means for selected altitudes (where semiannual component is strong).</td>
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<th>Harmonic decomposition of the ( T_z ) and ( H_2O ) zonal mean time series: MIPAS and WACCM annual and semi-annual components</th>
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<td>Highlights from MIPAS oscillations from 2007 to 2012:</td>
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<td><strong>Stratosphere:</strong></td>
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<tr>
<td>- Tape recorder slightly faster and drier than WACCM</td>
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<tr>
<td>- Oscillations at equator consistent with ( w^* )</td>
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<td>- WACCM and MIPAS AO and SAO in excellent agreement</td>
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<td><strong>Mesosphere:</strong></td>
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<td>- ( H_2O ) MSAO signature at the equatorial mesosphere 30% smaller than WACCM</td>
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<td>- ( T_z ) middle-MSAO stronger and higher than WACCM</td>
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<td>- No detection of distinct ( H_2O ) MSAO maximum at ( 75 ) km</td>
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<td>- Upper MSAO seasonally asymmetric in ( T_z ) and ( H_2O )</td>
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<td>- Half month lag between ( H_2O ) and ( T_z ) SAOs and MSAOs</td>
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<td>- No strong correlation between SAO and MSAO strengths</td>
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There is a year to year variation in the SAOs magnitudes but not in the structures. The example below is for \( T_z \) SAO.